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PATENT APPLICATION

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

ATTORNEY DOCKET NO. 200311559-1

Inventor(s): **Tony Cruz-Uribe et al.**

Application No.: **10/685,842**

Filing Date: **October 14, 2003**

Confirmation No.: 8443

Examiner: LIANG, Leonard S.

Group Art Unit: 2853

Title: A Method and a System for Single Ligament Fluid Dispensing

Mail Stop Amendment
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL LETTER FOR RESPONSE/AMENDMENT

Transmitted herewith is/are the following in the above-identified application:

☒ Response/Amendment
☐ New fee as calculated below
☒ No additional fee
☒ Other RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT Fee$
☐ Petition to extend time to respond
☐ Supplemental Declaration

CLAIMS AS AMENDED BY OTHER THAN A SMALL ENTITY						
(1) FOR	(2) CLAIMS REMAINING AFTER AMENDMENT	(3) NUMBER EXTRA	(4) HIGHEST NUMBER PREVIOUSLY PAID FOR	(5) PRESENT EXTRA	(6) RATE	(7) ADDITIONAL FEES
TOTAL CLAIMS	22	MINUS	68	= 0	X $50	$ 0
INDEP. CLAIMS	3	MINUS	14	= 0	X $200	$ 0
☐	FIRST PRESENTATION OF A MULTIPLE DEPENDENT CLAIM				+ $360	$ 0
EXTENSION FEE	☐ 1st Month $120	☐ 2nd Month $450	☐ 3rdMonth $1020	☐ 4th Month $1590		$ 0
					OTHER FEES	$
					TOTAL ADDITIONAL FEE FOR THIS AMENDMENT	$ 0

Charge $ 0 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450.

Date of Deposit: May 16, 2006

Typed Name: Rebecca R. Schow

Signature:

Respectfully submitted,

Tony Cruz-Uribe et al.

By

Steven L. Nichols
Attorney/Agent for Applicant(s)

Reg No. : 40,326

Date : May 16, 2006

Telephone : (801) 572-8066

Rev 10/05 (TransAmd)

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DUPLICATE

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Reg No. : 40,326

Date : May 16, 2006

Telephone : (801) 572-8066

Rev 10/05 (TransAmd)

Application No.: 10/685,842 Attorney Docket No.: 200311559-1

Certificate of Transmission

I hereby certify that this correspondence is being facsimile transmitted to Examiner Leonard S. Liang via the USPTO central facsimile number, (571) 273-8300.

on May 16, 2006
Date

Signature

Rebecca R. Schow
Typed or printed name of person signing Certificate

Transmitted, herewith, are the following documents:

1. Transmittal Letter for Response/Amendment with Duplicate Copy (2 pages)
2. Certificate of Transmission (1 page)
3. Response to Notice of Non-Compliant Amendment (2 pages)
4. Amendment (14 pages)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

Tony Cruz-Uribe et al.

Application No. 10/685,842

Filed: October 14, 2003

For: A Method and a System for Single Ligament Fluid Dispensing

Group Art Unit: 2853

Examiner: LIANG, Leonard S.

RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT

Commissioner for Patents
Washington, DC 20231

Sir:

In response to a non-final Official Action mailed on **January 11, 2006**, Applicant filed an amendment via facsimile on April 11, 2006. In response to the amendment of April 11, 2006, a Notice of Non-Compliant Amendment was issued indicating that the originally filed claims 66-68 were missing and that the new claims should be presented as 69-73. Consequently, Applicant responds with this paper, which includes a copy of the Amendment filed with the U.S. Patent & Trademark Office on April 11, 2006, with the amendment to the claims adjusted to comply with the Notice of Non-Compliant Amendment.

Applicant's amendment of April 11, 2006 was clearly a *bona fide* attempt to respond to the Office Action of January 11, 2006. Therefore, no fees are believed to be necessary in connection with this paper. However, if any fees are owed in connection with this paper, authorization is hereby given to charge those fees to deposit account number 08-2025 in the name of Hewlett-Packard Company.

Respectfully submitted,

DATE: 16 May 2006

Steven L. Nichols
Registration No. 40,326

Steven L. Nichols, Esq.
Managing Partner, Utah Office
Rader Fishman & Grauer PLLC
River Park Corporate Center One
10653 S. River Front Parkway, Suite 150
South Jordan, Utah 84095

(801) 572-8066
(801) 572-7666 (fax)

CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being transmitted to the Patent and Trademark Office facsimile number (571) 273-8300 on May 16, 2006. Number of Pages: 19

Rebecca R. Schow

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Application No. 10/685,842

Filed: October 14, 2003

For: A Method and a System for Single Ligament Fluid Dispensing

Group Art Unit: 2853

Examiner: LIANG, Leonard S.

AMENDMENT

Commissioner for Patents
Mail Stop Amendment
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

In response to the non-final Official Action mailed on January 11, 2006 and the Notice of Non-Compliant Amendment mailed April 20, 2006, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Please amend the following paragraphs as indicated:

[0030] As shown in the flow chart of Figure 4, the present method begins when the thermal inkjet dispenser fires a first quantity of fluid (step 400). Figure 5A illustrates how a thermal inkjet dispenser (300) similar to that shown in Figure 3B may controllably fire a first quantity of fluid. Once a computing device controllably signals the solid freeform fabrication apparatus (200; Fig. 2) to fire a quantity of fluid, heat in the TaAl layer (333) of the thermal dispenser is produced through electrical resistance heating. This heat is then transferred through the various layers ~~(330)~~ of the thermal inkjet dispenser (300) to the cavitation barrier (336) where the heat vaporizes locally contacted fluid (510). This vaporization of the fluid (510) is a result of heating the fluid to a temperature which exceeds the boiling point of the fluid thereby creating a nucleation effect. As the fluid (500) nucleates and expands, it displaces a volume of fluid (510) which is then forced out of the orifice (310) forming a quantity of fluid (530) that may be ejected towards a desired substrate (540).

[0032] As shown in Figure 5B, the first quantity of fluid (530) includes a leading head portion (532) and a tail portion (534). Typically there is a gap (550) between the tail portion (534) of an ejected quantity of fluid (530) and the head portion of a subsequently formed quantity of fluid (520). One factor that may be adjusted to aid in the subsequently formed quantity of fluid (520) "catching" the tail of a previously formed quantity of fluid (step 410~~step 430~~; Fig. 4) is the firing frequency of subsequent quantities of fluid. Essentially, the firing frequency of subsequent quantities of fluid may be adjusted in order to minimize the gap (550) created between the tail portion (534) of the ejected quantity of fluid

(530) and the head portion of the subsequently formed quantity of fluid (520). However, the frequency of a thermal inkjet dispenser (300) is usually constrained somewhat by the need for a desired flow rate. Firing frequencies may be maximized within the range of flow rate constraint in order to facilitate continuous ligament behavior. When a thermal inkjet dispenser operates at higher firing frequencies, continuous ligament behavior is facilitated not only due to the small time between quantities of fluid but also because of chamber refill behavior at these frequencies.

[0044] Once the meniscus (810) is retracted as shown in FIG. 8B, another electrical signal causes the controllable actuator (690) to reverse its displacement causing pressure surge in the material firing chamber. As shown in FIG. 8C, the surge in the pressure within the material firing chamber causes the meniscus (810) to bulge resulting in an ejection of a quantity (830) of fluid (800) towards a desired substrate (840). The quantity (830) of fluid (800) includes a leading edge (832) and a trailing portion ~~(832)~~ (834).

IN THE CLAIMS:

Please amend the claims as follows:

1. (currently amended) A method for dispensing a single ligament of fluid with an inkjet dispenser comprising:

ejecting a first quantity of said fluid from said inkjet dispenser toward a substrate; and

ejecting subsequent quantities ~~a second quantity~~ of said fluid from said inkjet dispenser toward said substrate;

wherein said subsequent quantities ~~second quantity~~ of fluid [[is]] are ejected from said inkjet dispenser ~~at a frequency sufficient~~ such that said first quantity of said fluid and said subsequent quantities ~~second quantity~~ of said fluid form a single, continuous ligament of said fluid between said inkjet dispenser and ~~prior to contacting~~ said substrate.

2. (currently amended) The method of claim 1, further comprising ~~reining in~~ reducing a necking phenomena of said fluid.

3. (currently amended) The method of claim 2, wherein said ~~reining in~~ reducing a necking phenomena comprises increasing a viscosity of said fluid.

4. (currently amended) The method of claim 2, wherein said ~~reining in~~ reducing a necking phenomena comprises decreasing a surface tension of said fluid.

5. (currently amended) The method of ~~claim 4~~ claim 1, wherein said inkjet dispenser is disposed in an inkjet printer configured to form two-dimensional characters.

6. (original) The method of claim 5, wherein said fluid comprises ink.

7. (original) The method of claim 1, wherein said inkjet dispenser is disposed in a solid freeform fabrication apparatus.

8. (original) The method of claim 7, wherein said fluid comprises an object build material.

9. (original) The method of claim 7, wherein said fluid comprises an object support material.

10. (original) The method of claim 1, wherein said inkjet dispenser is disposed in a circuit formation apparatus.

11. (original) The method of claim 10, wherein said fluid comprises one of a conductive circuit build material, a semi-conductive build material, or a dielectric build material.

12. (original) The method of claim 10, wherein said single ligament of fluid contacts said substrate to form a circuit component.

13. (original) The method of claim 12, wherein said circuit component comprises one of a transistor, a trace, a capacitor, a resistor, an antenna, a display, or a radiofrequency identification tag.

14. (currently amended) The method of ~~claim 2~~ claim 1, wherein said fluid comprises an adhesive or binder.

15. (currently amended) A method for dispensing a single ligament of fluid from a thermal inkjet dispenser comprising:

ejecting a first quantity of said fluid having a head and a tail from said thermal inkjet dispenser toward a substrate; and

ejecting subsequent quantities ~~a second quantity~~ of said fluid having at least a head from said thermal inkjet dispenser toward said substrate;

wherein said subsequent quantities ~~second quantity~~ of fluid [[is]] are ejected from said thermal inkjet dispenser ~~at a frequency sufficient~~ such that said head of each of said subsequent quantities ~~second quantity~~ of fluid catches said tail of a preceding ~~said first~~ quantity of fluid ~~prior to contacting said substrate,~~ thereby forming a single, continuous ligament of said fluid between said dispenser and said substrate.

16. (original) The method of claim 15, further comprising choosing said fluid to have a viscosity above 2 centipoise at an operating temperature of said inkjet dispenser.

17. (original) The method of claim 15, further comprising choosing said fluid to have a surface tension below 30 dyne/centimeter.

18-68. (cancelled)

69. (new) A method for dispensing a single ligament of fluid with an inkjet dispenser comprising:

ejecting a first quantity of said fluid from said inkjet dispenser toward a substrate;

refilling a firing chamber of said dispenser with a second quantity of fluid less than said first quantity; and

ejecting said second quantity of said fluid from said inkjet dispenser toward said substrate;

wherein said second quantity of fluid is ejected from said inkjet dispenser such that said first quantity of said fluid and said second quantity of said fluid join to form a single ligament of said fluid prior to contacting said substrate.

70. (new) The method of claim 69, wherein said refilling a firing chamber with a second quantity of fluid less than said first quantity is performed by increasing backpressure in said firing chamber.

71. (new) The method of claim 69, wherein said refilling a firing chamber with a second quantity of fluid less than said first quantity is performed by increasing a viscosity of said fluid.

72. (new) The method of claim 69, wherein said refilling a firing chamber with a second quantity of fluid less than said first quantity is performed by decreasing impedance of an orifice of said firing chamber.

73. (new) The method of claim 69, wherein said refilling a firing chamber with a second quantity of fluid less than said first quantity is performed by increasing impedance of an inlet of said firing chamber.

REMARKS

This is a full and timely response to the non-final Official Action mailed **January 11, 2006.** Reconsideration of the application in light of the above amendments and the following remarks is respectfully requested.

Claim Status:

Claims 18-68 were withdrawn under a previous Restriction Requirement and are cancelled herein without prejudice or disclaimer. Applicant reserves the right to file any number of continuation or divisional applications to the withdrawn and now-cancelled claims or to any other subject matter described in the present application.

Also, by the forgoing amendment, the specification and various claims have been amended. New claims 69-73 have been added.

Thus, claims 1-17 and 69-73 are currently pending for further action.

Information Disclosure Statement:

The recent Office Action objected to an Information Disclosure Statement filed March 1, 2005 for lacking a legible copy of a foreign patent reference. Consequently, Applicant has filed a corrected Information Disclosure Statement with the present paper and requests consideration of the cited reference.

Drawings:

The recent Office Action also objected to the drawings on the grounds that reference character "330" was used twice to refer to different structures. Applicant has accordingly reviewed this issue and has amended paragraph 30 of the specification to remove the dual usage of reference character "330." Consequently, following entry of this amendment, the drawings and specification should be in compliance with 37 C.F.R. § 1.84(p)(4), and notice to that effect is respectfully requested.

Specification:

The recent Office Action next objected to informalities in paragraphs 0032 and 0044 of the specification. Accordingly, these paragraphs have been reviewed and amended herein. Following entry of this amendment, the informalities noted are believed to have been corrected, and notice to that effect is respectfully requested.

Prior Art:

Claims 1, 2 and 15-16 were rejected as anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 4,686,539 to Schmidle et al. ("Schmidle"). For at least the following reasons, this rejection is respectfully traversed.

Claim 1 recites:

> A method for dispensing a single ligament of fluid with an inkjet dispenser comprising:
> ejecting a first quantity of said fluid from said inkjet dispenser toward a substrate; and
> ejecting subsequent quantities of said fluid from said inkjet dispenser toward said substrate;
> wherein said subsequent quantities of fluid are ejected from said inkjet dispenser such that *said first quantity of said fluid and said subsequent quantities of said fluid form a single, continuous ligament of said fluid between said inkjet dispenser and said substrate.*

(emphasis added).

Independent claim 15 similarly recites:

> A method for dispensing a single ligament of fluid from a thermal inkjet dispenser comprising:

ejecting a first quantity of said fluid having a head and a tail from said thermal inkjet dispenser toward a substrate; and

ejecting subsequent quantities of said fluid having at least a head from said thermal inkjet dispenser toward said substrate;

wherein said subsequent quantities of fluid are ejected from said thermal inkjet dispenser such that said head of each of said subsequent quantities of fluid catches said tail of a preceding quantity of fluid thereby forming a single, continuous ligament of said fluid between said dispenser and said substrate.

(emphasis added).

The highlighted subject matter in these two claims is illustrated in, for example, Figs. 5D and 8C of Applicant's originally-filed specification.

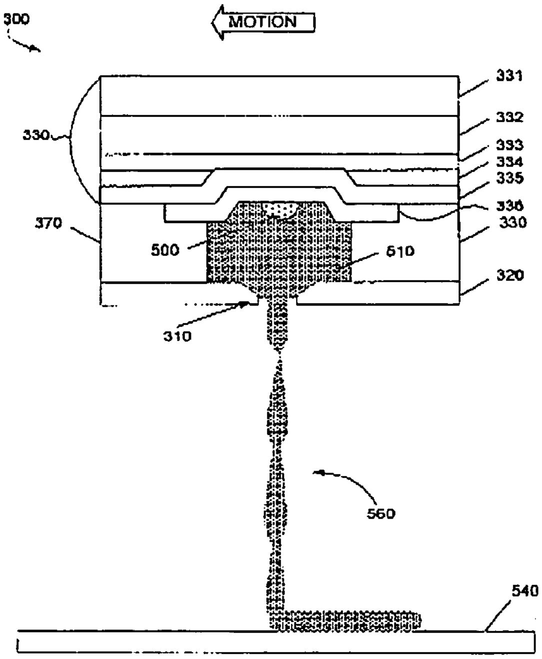

FIG. 5D

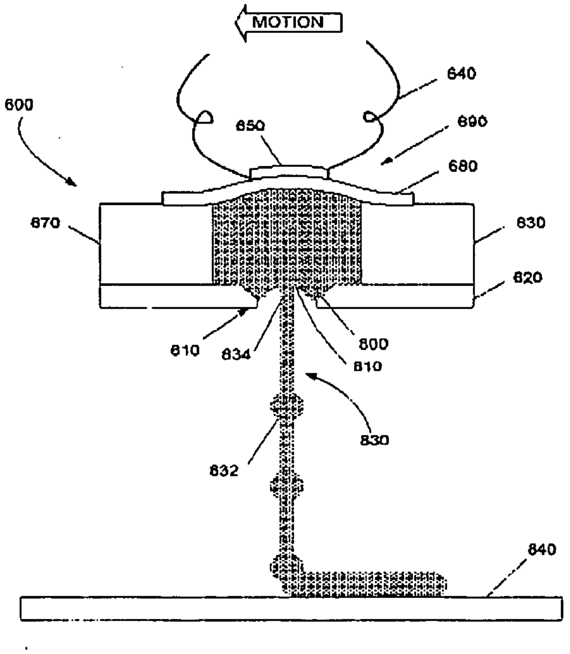

FIG. 8E

In contrast, Schmidle fails to teach or suggest the claimed methods of that include producing a single, continuous ligament of fluid between a dispenser and a substrate. To the contrary, Schmidle expressly teaches a method of dispensing fluid that results in several droplets that "merge in flight [to] form a single or ultimate droplet having a predetermined velocity." (Schmidle, abstract). This is clearly illustrated in Figs. 11 and 12 of Schmidle.

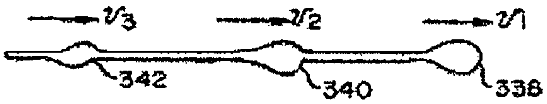

FIG. 11

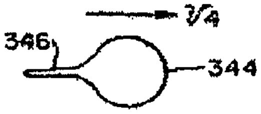

FIG. 12

According to Schmidle, "FIG. 11 shows typical ink droplets in early flight as produced by driving an ink jet printhead with the composite waveform of FIG. 10; and *FIG. 12 shows a typical "ultimate droplet" produced by the merger in flight of the droplets shown in FIG. 11.*" (Schmidle, col. 2, lines 52-56) (emphasis added).

Thus, Schmidle clearly fails to teach or suggest the claimed methods that include "forming a single, continuous ligament of said fluid between said dispenser and said substrate." "A claim is anticipated [under 35 U.S.C. § 102] only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). See M.P.E.P. § 2131. For at least these reasons, the rejection of independent claims 1 and 15, and their respective dependent claims, based on Schmidle should be reconsidered and withdrawn.

Additionally, claim 2 recites: "The method of claim 1, further comprising reducing a necking phenomena of said fluid." On this point, the recent Office Action cited Schmidle at col. 1, line 44 to col. 2, line 10. (Action of 1/11/06, p. 4). However, this portion of Schmidle does not even mention the necking phenomena and certainly does not teach reducing the necking phenomena as claimed. For at least this additional reason, the rejection of claims 2-6 should be reconsidered and withdrawn.

Dependent claims 3-6 and 17 were rejected under 35 U.S.C. § 103(a) over the combined teachings of Schmidle and U.S. Patent No. 5,916,358 to Bagchi et al. Claims 7-14 were rejected under 35 U.S.C. § 103(a) over the combined teachings of Schmidle and U.S. Patent No.6,503,831 to Speakman ("Speakman"). These rejections are respectfully traversed for at least the same reasons given above with respect to the original independent claims.

Conclusion:

The newly added claims are thought to also be patentable over the prior art of record for at least the reason that the prior art of record does not teach or suggest ejecting a second quantity of fluid less than a first quantity where the quantities join to form a single ligament of fluid prior to contacting a substrate.

For the foregoing reasons, the present application is thought to be clearly in condition for allowance. Accordingly, favorable reconsideration of the application in light of these remarks is courteously solicited. If the Examiner has any comments or suggestions which could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the number listed below.

Respectfully submitted,

DATE: May 16, 2006

Steven L. Nichols
Registration No. 40,326

Steven L. Nichols, Esq.
Managing Partner, Utah Office
Rader Fishman & Grauer PLLC
River Park Corporate Center One
10653 S. River Front Parkway, Suite 150
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